XIV.—*On the increase in Weight of Molasses casks occasionally arising from Absorption.*

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In September, 1851, attention was attracted to an unusual increase of weight in a shipment of molasses, which occurred in the London Docks ; it was some time before the cause could be discovered, and the steps taken to ascertain it ended in the perfect assurance that it

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was due to absorption. The great extent to which the action had taken place, and the large amount of property in our dock warehouses which is thus proved to be occasionally affected by it, lead me to believe that a detailed account of this extraordinary instance may prove acceptable to the Society. For the following particulars I am indebted to Mr. Muggeridge, of the London Docks, in whose care the molasses were stored, and by whom the progress of the action was watched.

In August, 1849, a quantity of molasses were housed for the first time in a damp cellar, where they lay until September, 1851, when the increase of weight was observed. In order to ascertain its amount, the whole of the casks of the importation were re-weighed, when it was found that every cask which had not lost a portion of its contents by breakage, had gained considerably in weight. The casks were coopered and made tight, and in February, 1852, were again weighed, when (where breakage had not occurred) a further increase was found to have taken place. The total weight of the shipment was 1270 cwt. It was stored in 110 casks, containing from 11 to 12 cwt. each. The increase on different casks varied considerably, reaching in some cases 38 lbs. or about 3 per cent of the contents. The total observed increase was $23\frac{1}{4}$ cwt., or about 1·83 per cent. This does not represent the total real increase, for it would appear that in some casks the absorbed water had just been sufficient to cover the loss from breakage, but not tell as increase; and there does not seem to have been one cask which had not suffered more or less loss. The real increase of weight due to absorption must have been much greater than that shown by the weighings. Important as this result was to the merchant, it was greatly exceeded by one that was afterwards observed, and which was as follows. A quantity of molasses imported in large tanks were, in July, 1849, racked into 347 puncheons, weighing about 12 cwt. each, the total weight being 4160 cwt.; they were stowed in a lofty cellar, where they remained till September, 1852, when they were re-weighed for delivery. At various times some of the casks were found with heads bulging out from internal pressure, although none of them were full when housed, and it was necessary to draw off a portion to prevent them from bursting. When the bung was started, the molasses rushed out with great force, ascending several feet to the roof of the cellar. On re-weighing, the increase was, as before, found to be different in different casks. On 52 there was a loss from breakage, 248 had gained from 1 lb. to 30 lbs. each, 67 from 30 lbs. to 40 lbs., and 20

from 40 lbs. to 51 lbs. each. The total increase of weight on the shipment was 56 cwt. If we take the casks on which this increase took place, laying aside the 52 on which there was loss, the excess of absorbed water over the leakage was about 1·6 per cent; in some of the casks it had reached as high a percentage as 4·25. A third case was also observed in December, 1848. 500 puncheons were filled from tanks in which they had been imported, and stored in the same cellar till July, 1852, when some of them were re-weighed with the same various results as to increase: 5 puncheons gave the following results:

No.	1,	weight	11	3	13	lbs.	gained	23	lbs.
„	2,	„	11	1	7	„	„	31	„
„	3,	„	12	0	7	„	„	40	„
„	4,	„	11	2	0	„	„	45	„
„	5,	„	12	0	0	„	„	68	„

This was the largest increase of weight, though on a large number of casks it reached nearly to the same percentage. In No. 5 the excess of water absorbed over any leakage that may have occurred is 5 per cent. The bungs were at this time started, and the casks, which had been stored not quite full, were found full to overflowing. One cask which had lost 14 lbs., and another 9 lbs., were also full, We know that these casks had not been overdrawn. Now, to effect a loss of 14 lbs., 4 gallons of treacle must have been replaced by water, not taking into account the quantity which was required to fill the cask completely. In the case of No. 5, where the increase of weight was 68 lbs., the quantity of water absorbed must have been very great, for after supplying the loss due to leakage, (and all casks leak more or less), 6·8 gallons of water entered through the pores of the wood during a period of $3\frac{1}{2}$ years. These puncheons, in which this maximum effect took place, had been American meal-casks, made of Quebec timber, which is much more porous than the wood of which West India puncheons are usually made. The specific gravity of the freshly-imported molasses of the last lot was 1·394, and when taken in July, 1852, was 1·375.